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Cruise Details and Biological Information from the Shelf Rockfish Sampling Cruise Aboard the *F/V EASTWARD HO*, October 31-November 24, 1988

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CRUISE DETAILS AND BIOLOGICAL INFORMATION FROM THE SHELF ROCKFISH SAMPLING CRUISE ABOARD THE F/V EASTWARD HO, OCTOBER 31-NOVEMBER 24, 1988

by

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ABSTRACT

Gillespie, G. E. and R. D. Stanley. 1989. Cruise details and biological information from the shelf rockfish sampling cruise aboard the F/V EASTWARD HO, October 31-November 24, 1988. Can. MS Rep. Fish. Aquat. Sci. 2045: 46 p.

Preliminary results are presented from a research cruise to collect biological samples of yellowtail rockfish, Sebastes flavidus, silvergray rockfish, S. brevispinis, and canary rockfish, S. pinniger, in British Columbia waters. 6,363 fish were sampled from traditional fishing grounds in Queen Charlotte Sound and off the northwest coast of Vancouver Island. Sixteen samples of yellowtail rockfish, ten samples of silvergray rockfish and two samples of canary rockfish were obtained. The copepod parasite Sarcotaces arcticus was present in 1.5% of the silvergray rockfish sampled in Queen Charlotte Sound, and 0.4% sampled off Vancouver Island.

RÉSUMÉ

Gillespie, G. E. and R. D. Stanley. 1989. Cruise details and biological information from the shelf rockfish sampling cruise aboard the F/V EASTWARD HO, October 31-November 24, 1988. Can. MS Rep. Fish. Aquat. Sci. 2045: 46 p.

Nous publions les résultats préliminaires d'une croisière de recherche entreprise pour recueillir des échantillons biologiques de sébaste à queue jaune, Sebastes flavidus, de sébaste argenté, Sebastes brevispinis, et de sébaste canari, Sebastes pinniger, dans les eaux de la Colombie-Britannique. Nous avons échantillonné 6 363 poissons provenant de fonds de pêche traditionnels dans le détroit de la Reine-Charlotte et au large de la côte nord-ouest de l'île de Vancouver, et avons obtenu 16 échantillons de sébaste à queue jaune, 10 échantillons de sébaste argenté et 2 échantillons de sébaste canari. Le copépode parasite Sarcotaces arcticus était présent dans 1,58% des échantillons de sébaste argenté provenant du détroit de la Reine-Charlotte et dans 0, 48% des échantillons provenant de l'île de Vancouver.

INTRODUCTION

The major species of the British Columbia shelf rockfish fishery are yellowtail rockfish, Sebastes flavidus, silvergray rockfish, S. brevispinis, and canary rockfish, S. pinniger. Stock assessment and management options for these species (Stanley 1988a) are based on historical landing statistics and analyses of biological information from commercial and research samples.

The primary purpose of this cruise was to collect biological samples of these three species from all management subareas of Queen Charlotte Sound and northwestern Vancouver Island. Secondary purposes included collection of whole, frozen yellowtail rockfish for parasite assays; collection of yellowtail rockfish tissue samples for electrophoretic analysis; and comparison of yellowtail rockfish size composition between bottom and midwater trawl operations. The results of these secondary analyses will be presented elsewhere.

METHODS

Vessel and Nets

Samples were collected on board the F/V EASTWARD HO, a 32.6 m (107 ft) Canadian commercial stern trawler, equipped for both bottom and midwater trawling (Appendix Table 1, Appendix Figures 1 and 2).

Trawl Locations

Trawl locations were determined by the captain, based on the broad sampling scheme of the cruise. Given a traditional fishing ground and species to target on, the exact tow location was his decision.

Sampling of Tows

Methods for determining catch weights and species compositions follow those of Nagtegaal et al. (1986). Catches <0.5 t were sorted completely and weighed by species. Catches >0.5 t were weighed with an MSI Sea Weigh Model 2200 Load Cell. The full codend was weighed, the catch spilled onto the deck and the empty codend re-weighed to obtain the weight of the catch by difference. The catch was then subsampled for species composition and the total catch weight applied to the proportions calculated from the subsamples. When weighing was not practical, the

skipper's estimate of catch weight was used. Catch weights were recorded in pounds and later converted to kilograms.

Biological data in the form of fork length (to the nearest cm), sex and maturity were recorded for yellowtail, silvergray and canary rockfishes for most tows which contained sufficient numbers for complete samples. Sagittal otoliths were collected for many of these samples and stored for age determination.

Presence of the parasite Sarcotaces arcticus in silvergray rockfish was recorded beginning with tow 3. Incidence of the parasite was recorded only when a cyst or cysts were noted during examination for sex and maturity of the specimen. No attempt was made to search an entire fish for presence of the cyst, nor were the number of cysts counted. The parasite may have been present and gone unnoticed if the cysts were small, or in areas of the body other than the ventral body cavity.

RESULTS

Catch

Twenty-three bottom tows and two midwater tows were completed during the charter (Table 1, Figures 1 and 2). The three target species, S. flavidus, S. brevispinis and S. pinniger, comprised 68% of the total catch (Tables 2 and 3). The only other species to appear in notable quantities were arrowtooth flounder, Pacific cod and Pacific herring. Most of the latter were caught in haul 15, a midwater tow on the southeast edge of Goose Island Gully (GIG) (Figure 1, Appendix Table 2).

The three target species exhibited differing catch rates by locality (Table 4). Yellowtail rockfish catch rate was highest in haul 16, a midwater tow off Triangle Island (Figure 1, Appendix Table 2). Silvergray rockfish catch rates were highest at the Topknot and South Scott Islands localities, with moderate rates at Cape Scott and southeast of Cape St. James (Figures 1 and 2, Appendix Table 2). Canary rockfish catch rates were generally low, but were extremely high in haul 20, a bottom tow west of Cape Cook (Figure 2, Appendix Table 2).

Biological Sampling

Biological data were recorded for the three target species, with 6,363 individuals sampled and 3,640 otoliths taken

(Table 5). Most of the samples were yellowtail and silvergray rockfish. Canary rockfish were sampled in only two localities, west of Cape Cook and Nootka, due to small catches in other areas.

Yellowtail rockfish samples from different localities exhibited modal lengths between 43 and 47 cm for females, and 46 to 47 cm for males (Table 6). Silvergray rockfish samples from different localities had modal lengths between 48 and 53 cm for females, and 48 and 50 cm for males (Table 7). Canary rockfish samples from two different localities had modes of 46 and 55 cm for females, and 49 and 53 cm for males (Table 8).

Yellowtail rockfish sampled were predominantly male, with samples from Cape Scott (87% male), Triangle Island (88% male), S.E. Goose (82% male), S.W. Goose (76% male), Nootka (71% male) and Esperanza (59% male). Silvergray rockfish ranged from a nearly equal sex ratio at Cape St. James (50% male), Cape Scott (53% male) and Triangle Island (54% male), to predominantly female catches at S.E. Goose (39% male), South Scott Islands (31% male) and Topknot (26% male). Canary rockfish catches were predominantly male, with samples from Nootka (58% male) and West Cape Cook (68% male). All three species exhibited a broad trend towards a relatively larger proportion of females in the catch from the more southern sampling localities.

Stages of gonad maturity varied among species and localities. Yellowtail rockfish females were primarily in the developing and developed stages, with samples from S.W. Goose and Cape Scott having a larger proportion in the developing stage (Table 9). S.E. and S.W. Goose both had high proportions of immature females. Male yellowtail rockfish were largely in the resting stage, except at S.W. Goose and Cape Scott, where nearly all were in the developing stage. Silvergray rockfish females were mainly in the resting stage, with the exception of Cape St. James, where a number were in the developing stage (Table 10). Silvergray males were mainly in the developing stage, with the exception of Cape St. James, where nearly half the males sampled were in the developed stage, and S.E. Goose, with the majority of the males sampled in the resting stage. Canary rockfish females were mainly in the developing and developed stages, with the majority of those sampled from West Cape Cook being in the latter stage, and those sampled from Nootka with a larger proportion in the developing stage (Table 11). Canary males sampled from West Cape Cook were nearly all resting, while those sampled at Nootka were split nearly equally between the resting and developing stages.

Stanley (1988b) reported that prevalence of the copepod parasite Sarcotaces arcticus in silvergray rockfish decreased with increasing length and that prevalence was lower in 1986 relative

to 1985. These trends were supported by the results of this survey (Tables 12 and 13).

It was also noted that the overall prevalence of the parasite was 1.5% in Queen Charlotte Sound, and 0.4% off the west coast of Vancouver Island. Males tended to have a higher infection rate than females in both areas. Stanley (1988b) reported nearly equal infection rates for both sexes of host.

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LITERATURE CITED

Nagtegaal, D. A., R. D. Stanley and B. M. Leaman. 1986. Catches and trawl locations of the R/V G.B. REED and F/V EASTWARD HO during Pacific ocean perch assessment cruise to Queen Charlotte Sound, August-September, 1984. Can. Data Rep. Fish. Aquat. Sci. 611: 109 p.

Stanley, R. D. 1988a. Shelf rockfish. In: Fargo, J., M. W. Saunders and A.V. Tyler [eds.]. 1988. Groundfish stock assessments for the west coast of Canada in 1987 and recommended yield options for 1988. Can. Tech. Rep. Fish. Aquat. Sci. 1617: 227-272.

Stanley, R. D. 1988b. Cruise details and biological observations from rockfish charters to the west coast of Vancouver Island aboard the F/V HOWE BAY, July 24-31 and August 24-29, 1985, and the F/V ARCTIC OCEAN, July 28-August 5, 1986. Can. MS Rep. Fish. Aquat. Sci. 1981. 77 p.

Table 1. Haul numbers and total effort by locality and gear, F/V EASTWARD HO, October 31 to November 24, 1988. All hauls are bottom trawl, unless designated as midwater trawl (MW).

Locality	Haul #	Effort (h)
SE Cape St. James	1-3	5.83
SW Corner GIG	4-6	8.25
Cape Scott	7-9	9.22
Triangle Island	10-11	9.45
SE Edge GIG	12-13	9.12
NE Corner GIG	14	0.67
SE Edge GIG (MW)	15	4.33
Triangle Island (MW)	16	6.33
South Scott Islands	17	1.50
Topknot	18-19	4.75
West Cape Cook	20	1.00
Esperanza	21,22,25	5.48
Nootka	23,24	4.12

Table 2. Catch weights (kg) and percent of total catch by species, F/V EASTWARD HO, October 31 to November 24, 1988. Other species includes all those which represented less than 1% of the total catch. See Table 15 for common names of species.

Species	Weight (kg)	Percent of total
S. flavidus	17970.	34.01
S. brevispinis	10023.	18.97
S. pinniger	7912.	14.97
S. paucispinis	5756.	10.89
S. alutus	3378.	6.39
Atheresthes stomias	1399.	2.65
S. entomelas	1335.	2.53
Clupea harengus pallasii	907.	1.72
S. proriger	756.	1.43
Gadus macrocephalus	545.	1.03
Other species	2860.	5.41
Total catch	52841.	100.00

Table 3. Total catch per unit effort (CPUE) of major species caught by the F/V EASTWARD HO, October 31 to November 24, 1988.

Species	CPUE (kg/h)
Sebastes flavidus	256.53
S. brevispinis	143.08
S. pinniger	112.95
S. paucispinis	82.17
S. alutus	48.22
Atheresthes stomias	19.97
S. entomelas	19.06
Clupea harengus pallasii	12.95
S. proriger	10.79
Gadus macrocephalus	7.78

Table 4. Mean catch per unit effort (CPUE) and standard errors (S.E.) of yellowtail rockfish, Sebastes flavidus, silvergray rockfish, S. brevispinis, and canary rockfish, S. pinniger, by locality and gear, F/V EASTWARD HO, October 31 to November 24, 1988. All hauls are bottom trawl, unless designated as midwater trawl (MW).

Locality	Species	CPUE (kg/h)	S.E.
SE Cape St. James	S. flavidus	0.94	0.92
	S. brevispinis	270.77	80.87
	S. pinniger	17.61	17.59
SW Corner GIG	S. flavidus	214.63	107.49
	S. brevispinis	0.54	0.51
	S. pinniger	18.24	9.51
Cape Scott	S. flavidus	68.98	68.96
	S. brevispinis	362.05	167.57
	S. pinniger	53.15	44.65
Triangle Island	S. flavidus	241.34	106.51
	S. brevispinis	63.48	38.52
	S. pinniger	2.36	2.34
Triangle Island (MW)	S. flavidus	859.47	0.00
SE Edge GIG	S. flavidus	255.13	86.88
	S. brevispinis	112.21	107.88
	S. pinniger	8.68	8.66
SE Edge GIG (MW)	S. flavidus	104.82	0.00
NE Corner GIG	S. brevispinis	6.05	0.00
South Scott Islands	S. flavidus	41.38	0.00
	S. brevispinis	514.72	0.00
	S. pinniger	86.05	0.00
Topknot	S. flavidus	48.27	48.26
	S. brevispinis	532.65	387.44
West Cape Cook	S. flavidus	726.05	0.00
	S. pinniger	6531.05	0.00
Esperanza	S. flavidus	214.39	183.11
	S. brevispinis	18.88	21.95
	S. pinniger	20.63	18.34
Nootka	S. flavidus	769.73	227.51
	S. brevispinis	101.10	8.98
	S. pinniger	240.58	340.21

Table 5. Summary of rockfish biological samples taken on the F/V EASTWARD HO, October 31-November 23, 1988. (Sample types: L/S/M = length, sex, and maturity stage; L/S/M/O = length, sex, maturity stage, and double otoliths; PARASITE = whole fish frozen for parasite assay; and TISSUE = tissue samples for electrophoretic analysis.)

Species	Area	Sample type	n
Sebastes flavidus	SW Corner GIG	L/S/M/O	400
	SW Corner GIG	L/S/M	200
	SW Corner GIG	PARASITE	20
	SE Edge GIG	L/S/M/O	200
	SE Edge GIG	L/S/M	401
	SE Edge GIG	TISSUE	15
	Cape Scott	L/S/M/O	300
	Cape Scott	PARASITE	20
	Triangle Island	L/S/M/O	300
	Triangle Island	L/S/M	600
	West Cape Cook	PARASITE	20
	Esperanza	L/S/M	259
	Esperanza	PARASITE	20
	Nootka	L/S/M/O	350
	Nootka	L/S/M	250
	Nootka	PARASITE	20
Total S. flavidus			3375
S. brevispinis	SE Cape St James	L/S/M/O	495
	SE Cape St James	L/S/M	126
	SE Edge GIG	L/S/M/O	300
	Cape Scott	L/S/M/O	395
	Cape Scott	L/S/M	200
	Triangle Island	L/S/M/O	100
	Triangle Island	L/S/M	102
	South Scott Islands	L/S/M/O	300
	Topknot	L/S/M/O	200
	Topknot	L/S/M	295
Total S. brevispinis			2513
S. pinniger	West Cape Cook	L/S/M/O	300
	Nootka	L/S/M	175
Total S. pinniger			475
Grand Total All Rockfish			6363

Table 6. Length frequency and maturity stage summaries by sex for yellowtail rockfish, Sebastes flavidus, F/V EASTWARD HO, October 31 to November 24, 1988. Fork lengths are measured to the nearest cm. See Table 14 for maturity stage key.

Area	S.W. Goose				Total	
Date	Nov. 6		Nov. 6		for Area	
Depth (m)	150		165			
Haul No.	5		6			
	M	F	M	F	M	F
Length (cm)						
31	0	0	0	0	0	0
32	0	0	1	0	1	0
33	1	1	2	1	3	2
34	1	1	3	0	4	1
35	3	0	1	2	4	2
36	5	2	5	2	10	4
37	7	4	10	6	17	10
38	8	6	2	4	10	10
39	5	4	10	4	15	8
40	11	3	6	5	17	8
41	8	3	18	3	26	6
42	9	5	10	7	19	12
43	12	2	18	11	30	13
44	13	0	12	13	25	13
45	33	1	20	10	53	11
46	33	0	21	4	54	4
47	49	5	29	8	78	13
48	32	1	11	5	43	6
49	14	1	12	5	26	6
50	12	5	5	5	17	10
51	0	0	2	5	2	5
52	0	0	0	1	0	1
53	0	0	0	0	0	0
54	0	0	0	0	0	0
55	0	0	1	0	1	0
56	0	0	0	0	0	0
57	0	0	0	0	0	0
Total	256	44	199	101	455	145
Maturity stage						
1	18	20	12	15	30	35
2	237	21	185	80	422	101
3	0	2	0	1	0	3
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	1	0	1	0
7	1	1	1	5	2	6
9	0	0	0	0	0	0

Table 6 (cont'd)

Area	Cape Scott		Total for Area	
Date	Nov. 8			
Depth (m)	192			
Haul No.	8			
	M	F	M	F
Length (cm)				
31	1	0	1	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	1	0	1	0
38	0	0	0	0
39	3	1	3	1
40	5	0	5	0
41	8	0	8	0
42	20	1	20	1
43	27	1	27	1
44	28	6	28	6
45	35	7	35	7
46	29	3	29	3
47	39	5	39	5
48	28	4	28	4
49	25	6	25	6
50	8	0	8	0
51	2	5	2	5
52	2	0	2	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
Total	261	39	261	39
Maturity stage				
1	1	1	1	1
2	260	36	260	36
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	2	0	2
9	0	0	0	0

Table 6 (cont'd)

Area	Triangle Island						Total for Area	
Date	Nov. 10		Nov. 10		Nov. 14			
Depth (m)	174		186		192			
Haul No.	10		11		16			
	M	F	M	F	M	F	M	F
Length (cm)								
31	0	0	1	0	0	0	1	0
32	1	0	0	0	0	0	1	0
33	0	0	0	0	1	0	1	0
34	1	0	0	1	0	0	1	1
35	0	1	0	0	3	0	3	1
36	1	0	0	0	0	0	1	0
37	0	1	1	0	0	0	1	1
38	1	2	0	0	0	1	1	3
39	3	0	2	2	0	0	5	2
40	3	0	4	0	0	0	7	0
41	6	0	18	1	14	0	38	1
42	8	0	15	2	17	0	40	2
43	8	2	30	1	28	0	66	3
44	26	2	18	3	21	0	65	5
45	47	3	43	4	37	1	127	8
46	64	3	29	9	38	3	131	15
47	44	3	38	7	51	3	133	13
48	30	1	23	7	38	6	91	14
49	22	1	16	9	17	2	55	12
50	8	1	6	4	4	5	18	10
51	3	1	2	2	0	5	5	8
52	0	1	1	0	1	2	2	3
53	0	1	1	0	0	2	1	3
54	0	0	0	0	0	0	0	0
55	1	0	0	0	0	0	1	0
56	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0
Total	277	23	248	52	270	30	795	105
Maturity stage								
1	1	4	3	3	1	0	5	7
2	173	18	161	40	51	5	385	63
3	0	0	0	0	0	24	0	24
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	103	1	84	9	218	1	405	11
9	0	0	0	0	0	0	0	0

Table 6 (cont'd)

Area	S.E. Goose				Total for Area	
Date	Nov. 12		Nov. 14			
Depth (m)	124		166			
Haul No.	12		15			
	M	F	M	F	M	F
Length (cm)						
31	0	0	0	0	0	0
32	0	0	0	0	0	0
33	0	0	0	0	0	0
34	0	0	0	0	0	0
35	1	0	0	0	1	0
36	0	1	0	0	0	1
37	2	1	2	0	4	1
38	3	1	2	2	5	3
39	2	0	1	5	3	5
40	3	0	3	2	6	2
41	11	2	1	2	12	4
42	11	0	4	3	15	3
43	12	2	3	2	15	4
44	26	1	19	3	45	4
45	24	6	30	3	54	9
46	51	3	33	10	84	13
47	44	2	34	10	78	12
48	36	7	47	5	83	12
49	22	3	31	6	53	9
50	14	4	17	2	31	6
51	5	0	9	8	14	8
52	0	0	2	10	2	10
53	0	0	0	3	0	3
54	0	0	0	1	0	1
55	0	0	0	1	0	1
56	0	0	0	0	0	0
57	0	0	0	0	0	0
Total	267	33	238	78	505	111
Maturity stage						
1	1	4	3	19	4	23
2	87	21	35	16	122	37
3	0	5	0	39	0	44
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	179	3	200	4	379	7
9	0	0	0	0	0	0

Table 6 (cont'd)

Area	Esperanza		Nootka				Total for Nootka	
Date	Nov. 17		Nov. 19		Nov. 19			
Depth (m)	159		174		146			
Haul No.	22		23		24			
	M	F	M	F	M	F	M	F
Length (cm)								
31	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0
33	1	2	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	1	1	0	0	0	0	0	0
36	3	0	0	1	0	0	0	1
37	2	2	0	0	0	0	0	0
38	3	0	0	1	0	0	0	1
39	3	5	0	0	1	1	1	1
40	8	7	2	0	6	3	8	3
41	6	7	6	0	8	2	14	2
42	12	7	14	0	16	2	30	2
43	16	16	12	4	30	5	42	9
44	10	8	16	6	29	6	45	12
45	14	21	27	6	28	12	55	18
46	24	8	38	10	30	14	68	24
47	8	17	33	14	21	14	54	28
48	9	8	24	6	20	9	44	15
49	3	7	22	15	10	12	32	27
50	2	4	14	9	4	9	18	18
51	0	4	3	5	1	3	4	8
52	0	1	0	4	1	2	1	6
53	0	3	0	1	0	1	0	2
54	1	1	1	3	0	0	1	3
55	0	3	0	1	0	0	0	1
56	0	1	0	0	0	0	0	0
57	0	0	0	1	0	0	0	1
Total	126	133	212	87	205	95	417	182
Maturity stage								
1	12	26	1	4	0	3	1	7
2	19	51	8	20	101	31	109	51
3	0	50	2	63	0	61	2	124
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0
7	95	6	201	0	104	0	305	0
9	0	0	0	0	0	0	0	0

Table 6 (cont'd)

Area Date Depth (m) Haul No.	Grand Total All Areas	
	M	F
Length (cm)		
31	2	0
32	2	0
33	5	4
34	5	2
35	9	4
36	14	6
37	25	14
38	19	17
39	30	22
40	51	20
41	104	20
42	136	27
43	196	46
44	218	48
45	338	74
46	390	67
47	390	88
48	298	59
49	194	67
50	94	48
51	27	38
52	7	21
53	1	11
54	2	5
55	2	5
56	0	1
57	0	1
Total	2559	715
Maturity stage		
1	53	99
2	1319	339
3	0	245
4	0	0
5	0	0
6	1	0
7	1186	32
9	0	0

Table 7. Length frequency and maturity stage summaries by sex for silvergray rockfish, Sebastes brevispinis, F/V EASTWARD HO, October 31 to November 24, 1988. Fork lengths are measured to the nearest cm. See Table 14 for maturity stage key.

Area	Cape St. James						Total	
Date	Nov. 4		Nov. 5		Nov. 5		for Area	
Depth (m)	210		203		201			
Haul No.	1		2		3			
	M	F	M	F	M	F	M	F
Length (cm)								
35	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0
37	0	1	0	0	0	0	0	1
38	0	0	0	0	1	0	1	0
39	0	0	0	0	0	0	0	0
40	1	0	0	0	0	0	1	0
41	0	0	0	0	0	0	0	0
42	1	0	0	1	1	0	2	1
43	1	0	0	0	3	0	4	0
44	1	3	1	0	2	0	4	3
45	2	1	0	1	5	0	7	2
46	9	3	2	0	7	3	18	6
47	16	7	5	4	6	7	27	18
48	14	12	5	3	7	5	26	20
49	20	12	5	4	14	7	39	23
50	20	14	10	7	14	12	44	33
51	14	17	6	4	14	12	34	33
52	12	16	6	7	10	15	28	38
53	13	21	1	6	11	14	25	41
54	12	12	1	5	7	13	20	30
55	6	6	1	1	8	9	15	16
56	3	8	1	0	4	3	8	11
57	1	6	0	4	3	4	4	14
58	1	5	0	2	1	2	2	9
59	0	5	1	1	0	1	1	7
60	0	3	0	0	0	1	0	4
61	0	1	0	0	0	0	0	1
62	0	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0
Total	147	153	45	50	118	108	310	311
Maturity stage								
1	1	3	1	0	4	0	6	3
2	61	65	23	22	70	34	154	121
3	0	1	0	0	0	0	0	1
4	84	1	20	1	44	0	148	2
5	0	0	0	0	0	0	0	0
6	0	0	0	0	0	4	0	4
7	1	83	1	27	0	70	2	180
9	0	0	0	0	0	0	0	0

Table 7 (cont'd)

Area	Cape Scott				Total for Area	
Date	Nov. 8		Nov. 10			
Depth	179		183			
Haul No.	7		9			
	M	F	M	F	M	F
Length (cm)						
35	0	0	0	0	0	0
36	0	0	0	0	0	0
37	0	0	0	0	0	0
38	0	0	0	0	0	0
39	0	0	0	0	0	0
40	0	0	0	0	0	0
41	0	0	0	0	0	0
42	0	0	0	0	0	0
43	2	0	1	2	3	2
44	0	0	1	1	1	1
45	5	5	5	5	10	10
46	8	2	5	5	13	7
47	16	11	7	7	23	18
48	11	12	22	13	33	25
49	23	9	15	19	38	28
50	30	6	19	14	49	20
51	15	5	14	16	29	21
52	8	10	17	18	25	28
53	16	14	10	12	26	26
54	15	15	5	5	20	20
55	10	6	5	5	15	11
56	3	5	5	10	8	15
57	5	10	7	8	12	18
58	1	5	4	6	5	11
59	3	6	1	3	4	9
60	0	1	0	4	0	5
61	0	2	0	2	0	4
62	0	0	0	2	0	2
63	0	0	0	0	0	0
64	0	0	0	0	0	0
Total	171	124	143	157	314	281
Maturity stage						
1	3	1	2	1	5	2
2	168	29	141	14	309	43
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	1	0	0	0	1
7	0	93	0	142	0	235
9	0	0	0	0	0	0

Table 7 (cont'd)

Area	Triangle Is.		S.E. Goose		S. Scott Is.	
Date	Nov. 10		Nov. 13		Nov. 15	
Depth (m)	174		181		172	
Haul No.	10		13		17	
	M	F	M	F	M	F
Length (cm)						
35	0	0	1	0	0	0
36	0	0	0	0	0	0
37	0	0	0	0	0	0
38	0	0	1	0	0	0
39	0	0	1	0	0	0
40	0	0	0	0	0	0
41	2	0	1	2	0	0
42	0	0	1	3	1	0
43	0	0	4	2	2	1
44	2	0	5	6	3	4
45	3	3	7	8	4	5
46	7	2	9	7	8	13
47	7	6	11	13	15	15
48	13	10	13	26	18	29
49	11	12	7	24	9	28
50	23	9	16	21	13	16
51	13	9	10	18	5	32
52	9	9	12	10	5	20
53	4	5	8	14	3	12
54	6	5	0	6	4	10
55	3	4	4	4	2	8
56	2	2	5	0	2	3
57	2	3	1	7	0	4
58	1	6	0	6	0	5
59	1	2	0	3	0	0
60	0	2	0	0	0	0
61	1	1	0	1	0	1
62	0	2	0	0	0	0
63	0	0	0	1	0	0
64	0	0	0	1	0	0
Total	110	92	117	183	94	206
Maturity stage						
1	7	1	5	9	3	4
2	102	12	101	17	85	10
3	0	0	0	0	0	0
4	0	0	0	0	0	1
5	0	0	0	0	0	2
6	0	2	0	0	0	0
7	1	77	11	157	6	189
9	0	0	0	0	0	0

Table 7 (cont'd)

Area	Topknot	Topknot	Total	Grand Total
Date	Nov. 15	Nov. 15	for Area	All Areas
Depth (m)	155	155		
Haul No.	18	19		

	M	F	M	F	M	F	M	F
Length (cm)								
35	0	0	0	0	0	0	1	0
36	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	1
38	0	0	0	0	0	0	2	0
39	1	0	0	0	1	0	2	0
40	1	0	1	1	2	1	3	1
41	0	0	1	0	1	0	4	2
42	2	0	0	1	2	1	6	5
43	2	2	0	1	2	3	15	8
44	1	1	2	0	3	1	18	15
45	4	3	1	3	5	6	36	34
46	2	4	3	1	5	5	60	40
47	6	10	6	4	12	14	95	84
48	8	16	4	6	12	22	115	132
49	6	20	8	11	14	31	118	146
50	8	15	13	23	21	38	166	137
51	2	12	13	15	15	27	106	140
52	3	16	1	27	4	43	83	148
53	1	15	1	15	2	30	68	128
54	4	6	6	29	10	35	60	106
55	0	6	4	24	4	30	43	73
56	1	6	3	14	4	20	29	51
57	1	2	4	13	5	15	24	61
58	0	0	2	7	2	7	10	44
59	0	2	0	10	0	12	6	33
60	0	3	3	8	3	11	3	22
61	0	1	1	4	1	5	2	13
62	0	2	0	6	0	8	0	12
63	0	0	0	0	0	0	0	1
64	0	0	0	0	0	0	0	1
Total	53	142	77	223	130	365	1075	1438
Maturity stage								
1	5	6	3	6	8	12	34	31
2	38	25	65	39	103	64	854	267
3	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	148	3
5	0	0	0	0	0	0	0	2
6	0	0	0	1	0	1	0	8
7	10	111	9	177	19	288	39	1126
9	0	0	0	0	0	0	0	0

Table 8. Length frequency and maturity stage summaries by sex for canary rockfish, Sebastes pinniger, F/V EASTWARD HO, October 31 to November 24, 1988. Fork lengths are measured to the nearest cm. See Table 14 for maturity stage key.

Area	W. Cape Cook		Nootka		Grand Total All Areas	
Date	Nov. 16		Nov. 19			
Depth (m)	170		174			
Haul No.	20		23			
	M	F	M	F	M	F
Length (cm)						
38	0	0	2	0	2	0
39	0	0	0	1	0	1
40	0	0	0	0	0	0
41	0	0	2	1	2	1
42	1	1	2	1	3	2
43	1	1	6	3	7	4
44	6	0	6	5	12	5
45	12	2	10	3	22	5
46	5	3	8	5	13	8
47	15	2	11	8	26	10
48	10	0	11	6	21	6
49	17	5	15	5	32	10
50	21	4	9	8	30	12
51	25	7	4	3	29	10
52	16	5	8	2	24	7
53	31	9	3	7	34	16
54	18	11	3	7	21	18
55	8	19	1	4	9	23
56	12	12	0	1	12	13
57	4	5	1	1	5	6
58	1	5	0	1	1	6
59	0	2	0	0	0	2
60	0	3	0	1	0	4
61	0	0	0	0	0	0
62	0	1	0	0	0	1
Total	203	97	102	73	305	170
Maturity stage						
1	3	9	5	6	8	15
2	15	17	49	40	64	57
3	0	66	0	25	0	91
4	0	2	0	0	0	2
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	185	3	48	2	233	5
9	0	0	0	0	0	0

Table 9. Proportions of sampled yellowtail rockfish, Sebastes flavidus, at each maturity stage, by sex, F/V EASTWARD HO, October 31-November 24, 1988. See Table 14 for maturity stage key.

Females

Stage	S.W. Goose	S.E. Goose	Cape Scott	Triangle Island	Esperanza	Nootka
1	.241	.207	.026	.067	.195	.039
2	.697	.333	.923	.600	.384	.280
3	.021	.397	0	.228	.376	.681
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	.041	.063	.051	.105	.045	0
9	0	0	0	0	0	0

Males

Stage	S.W. Goose	S.E. Goose	Cape Scott	Triangle Island	Esperanza	Nootka
1	.066	.008	.004	.006	.095	.002
2	.927	.242	.996	.484	.151	.261
3	0	0	0	0	0	.005
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	.002	0	0	0	0	0
7	.005	.750	0	.509	.754	.731
9	0	0	0	0	0	0

Table 10. Proportions of sampled silvergray rockfish, Sebastes brevispinis, at each maturity stage, by sex, F/V EASTWARD HO, October 31-November 24, 1988. See Table 14 for maturity stage key.

Females

Stage	Cape St. James	S.E. Goose	Cape Scott	Triangle Island	S. Scott Islands	Topknot
1	.010	.049	.007	.011	.019	.033
2	.389	.093	.153	.130	.049	.175
3	.003	0	0	0	0	0
4	.006	0	0	0	.005	0
5	0	0	0	0	.010	0
6	.013	0	.004	.022	0	.003
7	.579	.858	.836	.837	.917	.789
9	0	0	0	0	0	0

Males

Stage	Cape St. James	S.E. Goose	Cape Scott	Triangle Island	S. Scott Islands	Topknot
1	.019	.049	.016	.064	.032	.062
2	.497	.093	.984	.927	.904	.792
3	0	0	0	0	0	0
4	.477	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	.007	.858	0	.009	.064	.146
9	0	0	0	0	0	0

Table 11. Proportions of sampled canary rockfish, Sebastes pinniger, at each maturity stage, by sex, F/V EASTWARD HO, October 31-November 24, 1988. See Table 14 for maturity stage key.

Females

Stage	West Cape Cook	Nootka
1	.093	.082
2	.175	.548
3	.680	.343
4	.021	0
5	0	0
6	0	0
7	.031	.027
9	0	0

Males

Stage	West Cape Cook	Nootka
1	.015	.049
2	.074	.480
3	0	0
4	0	0
5	0	0
6	0	0
7	.911	.471
9	0	0

Table 12. Prevalence of Sarcotaces arcticus by area and length of host, silvergray rockfish, Sebastes brevispinis, F/V EASTWARD HO, October 31-November 24, 1988. (n=number parasitized per length class; N=total number of specimens per length class.)

Males	Queen Charlotte Sound		Vancouver Island	
Length (cm)	n/N	%	n/N	%
<41	0/4	0.0	0/3	0.0
41-45	3/50	6.0	1/23	4.3
46-50	8/321	2.5	1/127	0.8
51-55	1/234	0.4	0/54	0.0
>55	0/50	0.0	0/17	0.0
Total	12/659	1.8	2/224	0.9

Females	Queen Charlotte Sound		Vancouver Island	
Length (cm)	n/N	%	n/N	%
<41	0/0	-	0/1	0.0
41-45	1/37	2.7	0/21	0.0
46-50	5/262	1.9	0/211	0.0
51-55	2/253	0.8	1/247	0.4
>55	0/112	0.0	0/91	0.0
Total	8/664	1.2	1/571	0.2

Table 13. Prevalence of Sarcotaces arcticus (as % parasitized) by length class and year in silvergray rockfish, Sebastes brevispinis, off the west coast of Vancouver Island. 1988 data collected on the F/V EASTWARD HO, October 31-November 24, 1988. 1986 and 1985 data from Stanley (1988b). (n=number parasitized per length class; N=total number of specimens per length class.)

Length (cm)	1985	1986	1988
<41	25.0	18.5	0.0
41-45	18.0	8.2	2.3
46-50	6.0	1.7	0.3
51-55	3.2	0.6	0.3
>55	0.4	0.1	0.0
Total	4.5	1.7	0.4

Table 14. Description of rockfish gonad maturity stages.

Code		Gonad condition
Females:	1	Immature (translucent, small)
	2	Developing (small yellow eggs, translucent or opaque)
	3	Developed (large yellow eggs, opaque)
	4	Fertilized (large orange-yellow eggs, translucent)
	5	Embryos or larvae (includes eyed eggs)
	6	Spent (large flaccid red ovaries, a few larvae may be present)
	7	Resting (moderate size, firm, red-grey ovaries)
Males:	1	Immature (translucent, string-like)
	2	Developing (swelling, brown-white)
	4	Developed (large, white; easily broken)
	5	Ripe (running sperm)
	6	Spent (flaccid, red)
	7	Resting (ribbon-like, small, brown)

Table 15. Scientific and common names for species encountered on the F/V EASTWARD HO, October 31 to November 24, 1988.

Rockfish	
Pacific ocean perch	*Sebastes alutus*
Redbanded rockfish	*S. babcocki*
Silvergray rockfish	*S. brevispinis*
Darkblotched rockfish	*S. crameri*
Splitnose rockfish	*S. diploproa*
Greenstriped rockfish	*S. elongatus*
Widow rockfish	*S. entomelas*
Yellowtail rockfish	*S. flavidus*
Shortbelly rockfish	*S. jordani*
Bocaccio	*S. paucispinis*
Canary rockfish	*S. pinniger*
Redstripe rockfish	*S. proriger*
Yellowmouth rockfish	*S. reedi*
Yelloweye rockfish	*S. ruberrimus*
Sharpchin rockfish	*S. zacentrus*
Shortspine thornyhead	*Sebastolobus alascanus*
Other Groundfish	
Sablefish	*Anoplopoma fimbria*
Arrowtooth flounder	*Atheresthes stomias*
Petrale sole	*Eopsetta jordani*
Pacific cod	*Gadus macrocephalus*
Rex sole	*Glyptocephalus zachirus*
Flathead sole	*Hippoglossoides elasodon*
Pacific halibut	*Hippoglossus stenolepis*
Rock sole	*Lepidopsetta bilineata*
Pacific hake	*Merluccius productus*
Dover sole	*Microstomus pacificus*
Lingcod	*Ophiodon elongatus*
English sole	*Parophrys vetulus*
Spiny dogfish	*Squalus acanthias*
Walleye pollock	*Theragra chalcogramma*
Others	
Whitebait smelt	*Allosmerus elongatus*
American shad	*Alosa sapidissima*
Pacific herring	*Clupea harengus pallasi*
Ratfish	*Hydrolagus colliei*
Chinook salmon	*Oncorhynchus tschawytscha*
Big skate	*Raja binoculata*
Eulachon	*Thaleichthys pacificus*
Prowfish	*Zaprora silenus*
Squid	*Loligo opalescens*

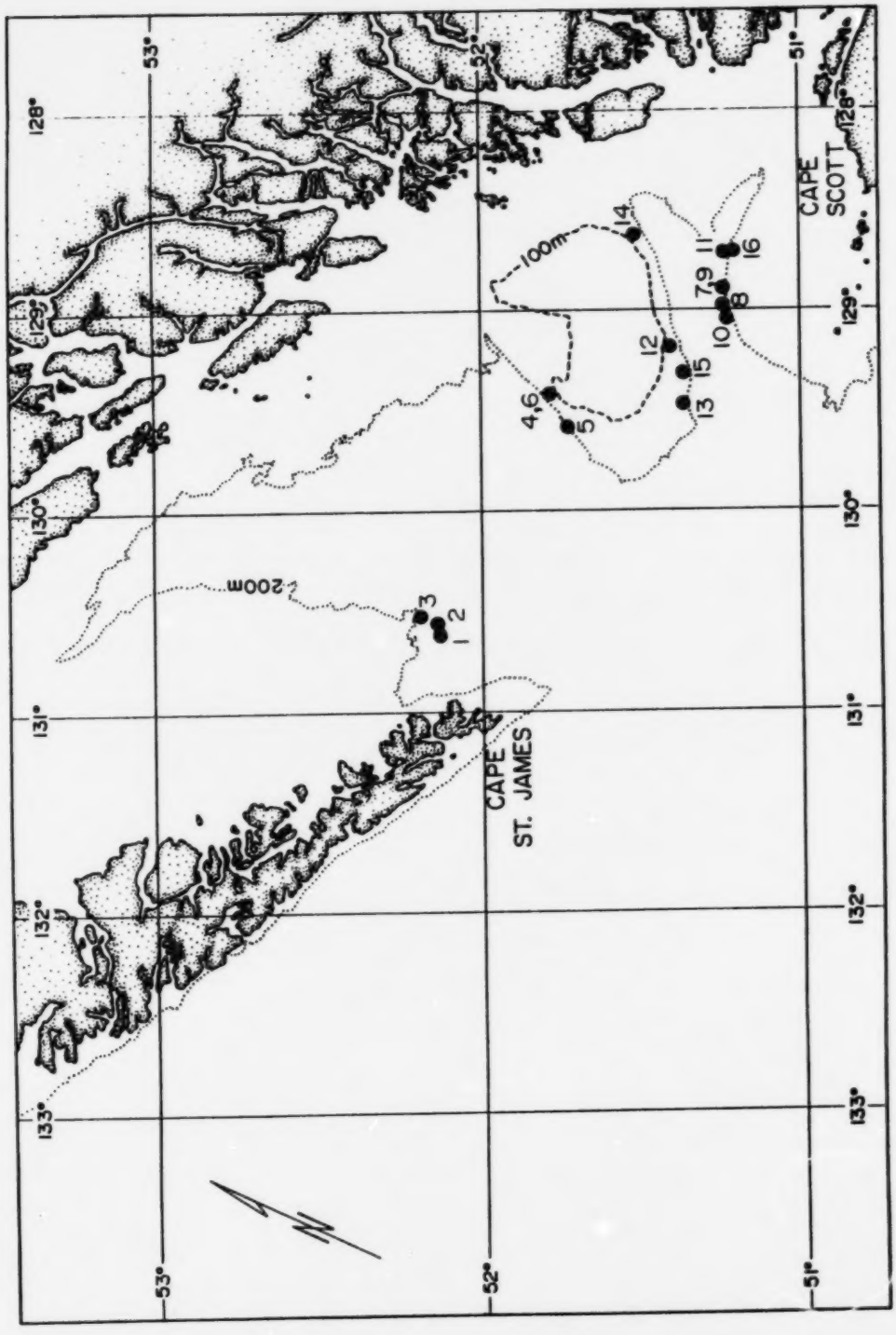

Fig. 1. Locations of tows completed in Queen Charlotte Sound on the F/V EASTWARD HO, October 31-November 24, 1988.

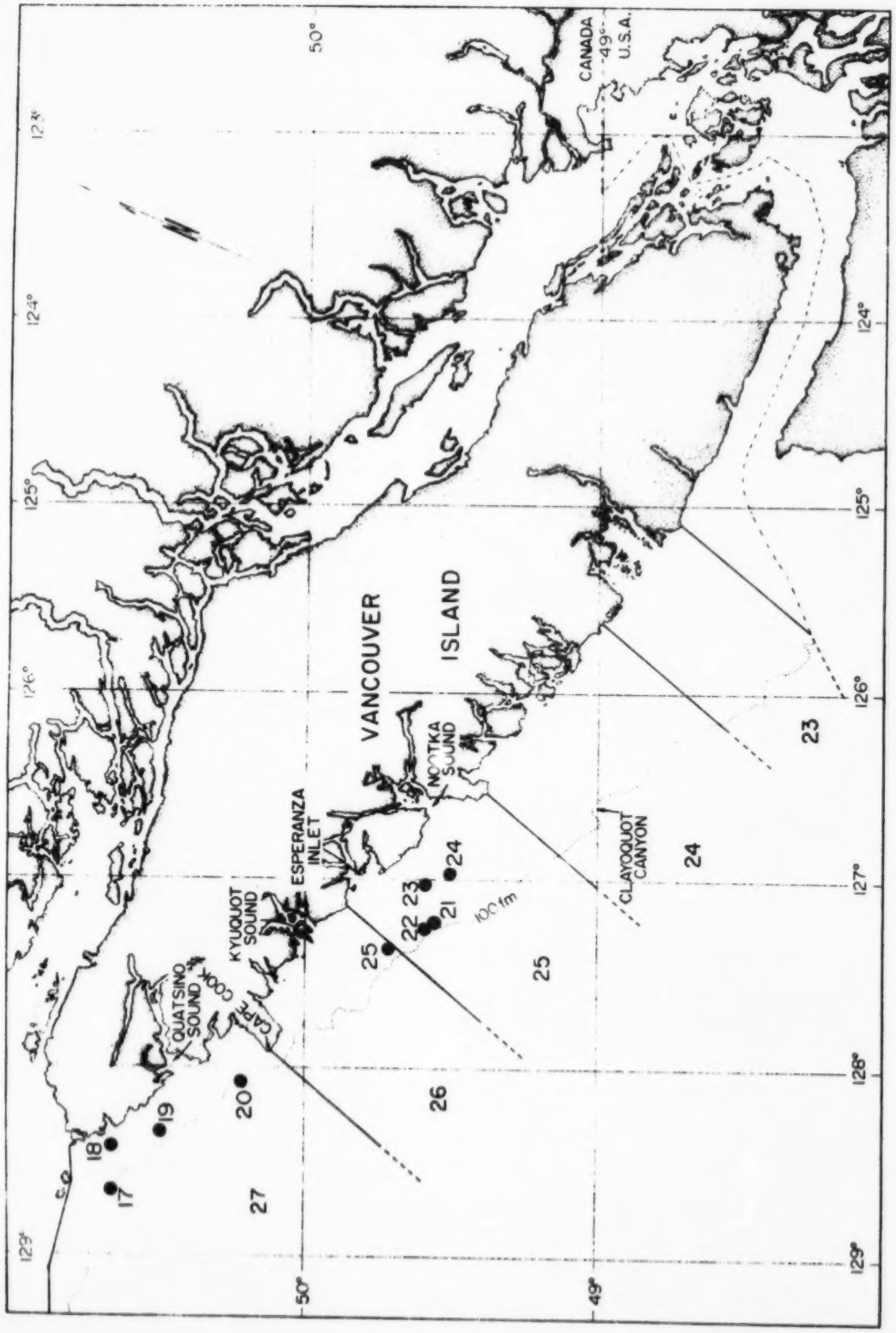

Fig. 2. Locations of tows completed off the west coast of Vancouver Island on the F/V EASTWARD HO, October 31 - November 24, 1988.

Appendix Table 1. Vessel specifications for the F/V EASTWARD HO.

Skippers: Gary Sigmund, Roger Shannon
Gross Tons: 277
Overall Length: 32.6 m
Capacity: 204.116 kg
Horsepower: 850
Crew (total): 5
Fish Storage: RSW, ice

ELECTRONIC AIDS:
Sounders: Epsco Chromoscope CUS885 Mk.1
Kelvin Hughes
Koden Chromoscope CVS-8812
Sonar: Wesmar
Radar: Sitex Koden
Kelvin Hughes
Autopilot: Wagner
Loran: Northstar 6000
Internav LC123
Net Sounder: Kelvin Hughes

TRAWL GEAR:
Double gear and two single winches
Cable per double spool: 1097 m
Diameter: 1.9 cm
Net Reel: standard hydraulic

Appendix Table 2. Bridge log information and catch by tow, F/V EASTWARD HO, October 31 to November 24, 1988.

Haul Number		1	2	3	4
Date		Nov 4	Nov 5	Nov 5	Nov 6
Area (Major, Minor)		5B,08	5B,08	5B,08	5B,08
Start Time	(PST)	14:03	7:55	9:50	11:50
Duration	(Min)	200	60	90	155
Start N. Lat.	(Deg)	52	52	52	51
	(Min)	9.3	7.2	8.0	42.1
W. Long	(Deg)	130	130	130	129
	(Min)	32.5	40.1	36.9	35.9
Start LORAN-C	X	12701.9	12682.3	12691.0	13113.4
	Y	30269.1	30257.7	30262.2	30201.9
Finish N. Lat.	(Deg)	52	52	52	51
	(Min)	8.4	8.0	11.1	47.1
W. Long	(Deg)	130	130	130	129
	(Min)	37.3	36.2	32.4	24.6
Finish LORAN-C	X	12686.9	12693.0	12691.4	13141.1
	Y	30263.3	30262.6	30275.2	30228.2
Haul Distance	(km)	5.7	4.6	7.8	15.9
	(N Mi)	3.1	2.5	4.2	8.6
Direction (Deg.True)		180	341	1	24
Bottom Depth	(m)	201- 198	218- 201	205- 194	132- 135
	(fa)	110- 108	119- 110	112- 106	72- 74
Modal Depth	(m)	210	203	201	133
Gear Type		BT	BT	BT	BT
Tide		Ebb	..	Flood	Slack
Total Catch	(kg)	5284	680	1197	50
Remarks		Usable	Snag-use	Snag-use	Usable

Appendix Table 2 (cont'd)

Haul Number	1	2	3	4
Date	Nov 4	Nov 5	Nov 5	Nov 6
Area (Major, Minor)	5B,08	5B,08	5B,08	5B,08
Arrowtooth flounder	158	..	112	..
English sole	..	..	..	..
Flathead sole	..	..	..	..
Pacific halibut	20	..	..	..
Petrale sole	..	..	..	..
Rex sole	..	..	..	..
Rock sole	..	..	..	1
Other flatfish	..	..	..	1
Sebastes alutus	2731	476	149	..
S. babcocki	40	..	9	..
S. brevispinis	1385	136	391	..
S. crameri	..	..	..	..
S. diploproa	..	..	..	..
S. elongatus	..	..	..	..
S. entomelas	79	..	..	..
S. flavidus	..	..	4	..
S. jordani	..	..	..	..
S. paucispinis	435	..	19	..
S. pinniger	..	..	79	..
S. proriger	277	34	298	..
S. reedi	20	..	..	..
S. ruberrimus	..	..	..	..
S. zacentrus	119	34	19	..
Other rockfish	..	..	4	..
Chinook salmon	..	..	..	..
Lingcod	..	..	..	45
Pacific cod	..	..	19	..
Pacific hake	..	..	..	..
Pacific herring	..	..	..	1
Sablefish	..	..	19	..
Walleye pollock	20	..	56	..
Other roundfish	..	..	..	..
Ratfish	..	..	..	..
Big skate	..	..	..	..
Spiny dogfish	..	..	19	2
Other selachii	..	..	..	..
Total Catch (kg)	5284	680	1197	50

Appendix Table 2 (cont'd)

Haul Number		5	6	7	8
Date		Nov 6	Nov 6	Nov 8	Nov 8
Area (Major, Minor)		5B,08	5B,08	5A,11	5A,11
Start Time	(PST)	15:05	19:30	14:55	17:30
Duration	(Min)	205	135	105	253
Start N. Lat.	(Deg)	51	51	51	51
	(Min)	47.6	42.0	13.0	14.5
W. Long	(Deg)	129	129	128	128
	(Min)	23.3	35.0	44.6	52.7
Start LORAN-C	X	13144.8	13118.3	13508.0	13460.7
	Y	30230.0	30202.0	30103.9	30107.0
Finish N. Lat.	(Deg)	51	57	51	51
	(Min)	42.5	47.1	14.1	14.2
W. LONG	(Deg)	129	129	128	128
	(Min)	36.4	25.4	52.5	58.5
Finish LORAN-C	X	13108.9	11657.2	13463.5	13433.4
	Y	30203.2	30830.9	30105.3	30102.9
Haul Distance	(km)	17.8	14.4	9.4	6.9
	(N Mi)	9.6	7.8	5.1	3.7
Direction (Deg.True)		225	22	268	190
Bottom Depth	(m)	143- 146	165- 143	181- 190	188- 196
	(fm)	78- 80	90- 78	99- 104	103- 107
Modal Depth	(m)	150	165	179	192
Gear Type		BT	BT	BT	BT
Tide		Slack	..	Ebb	Flood
Total Catch	(kg)	1623	1115	2494	1732
Remarks		Usable	Usable	Usable	Usable

Appendix Table 2 (cont'd)

Haul Number	5	6	7	8
Date	Nov 6	Nov 6	Nov 8	Nov 8
Area (Major, Minor)	5B,08	5B,08	5A,11	5A,11
Arrowtooth flounder	109	76	..	255
English sole	..	7	..	14
Flathead sole	..	..	..	..
Pacific halibut	..	..	..	6
Petrale sole	..	..	..	25
Rex sole	15	7	..	6
Rock sole	40	17	..	..
Other flatfish	..	..	..	..
Sebastes alutus	..	..	..	14
S. babcocki	..	..	..	..
S. brevispinis	5	..	873	121
S. crameri	..	..	..	..
S. diploproa	..	..	..	..
S. elongatus	..	..	..	..
S. elongatus	5	..	..	229
S. flavidus	1135	701	..	872
S. jordani	..	..	..	..
S. brevispinis	23	170	1372	51
S. pinniger	109	51	249	25
S. proriger	69	..	..	..
S. reedi	..	..	..	..
S. ruberrimus	..	..	..	..
S. zacentrus	..	..	..	..
Other rockfish	..	..	..	..
Chinook salmon	..	..	..	..
Lingcod	23	..	..	..
Pacific cod	46	7	..	51
Pacific hake	..	..	..	..
Pacific herring	..	..	..	..
Sablefish	..	..	..	..
Walleye pollock	34	..	..	6
Other roundfish	..	..	..	..
Ratfish	5	7	..	32
Big skate	5	..	..	..
Spiny dogfish	..	72	..	25
Other selachii	..	..	..	..
Total Catch (kg)	1623	1115	2494	1732

Appendix Table 2 (cont'd)

Haul Number		9	10	11	12
Date		Nov 10	Nov 10	Nov 10	Nov 12
Area (Major, Minor)		5A,11	5A,11	5A,11	5B,08
Start Time	(PST)	7:43	11:06	17:15	16:15
Duration	(Min)	195	312	255	292
Start N. Lat.	(Deg)	51	51	51	51
	(Min)	13.3	13.8	12.9	24.4
W. Long	(Deg)	128	128	129	129
	(Min)	42.5	52.1	2.8	15.5
Start LORAN-C	X	13517.2	13466.9	13418.2	13301.0
	Y	30106.3	30104.1	30095.1	30139.8
Finish N. Lat.	(Deg)	51	51	51	51
	(Min)	13.7	12.8	13.4	24.0
W. Long	(Deg)	128	129	128	129
	(Min)	52.0	1.5	41.8	10.1
Finish LORAN-C	X	13467.8	13424.0	13520.3	13330.3
	Y	30103.7	30095.2	30107.1	30140.8
Haul Distance	(km)	11.1	11.1	24.4	6.3
	(N Mi)	6.0	6.0	13.2	3.4
Direction (Deg.True)		248	58	30	270
Bottom Depth	(m)	187- 176	186- 163	185- 190	112- 135
	(fa)	102- 96	102- 89	101- 104	61- 74
Modal Depth	(m)	183	174	186	124
Gear Type		BT	BT	BT	BT
Tide		Flood	Flood	Ebb	..
Total Catch	(kg)	3629	2454	2721	2948
Remarks		Usable	Usable	Usable	Usable

Appendix Table 2 (cont'd)

Haul Number	9	10	11	12
Date	Nov 10	Nov 10	Nov 10	Nov 12
Area (Major, Minor)	5A,11	5A,11	5A,11	5B,08
Arrowtooth flounder	..	49	406	..
English sole	..	..	58	..
Flathead sole	..	..	..	..
Pacific halibut	..	147	25	63
Petrale sole	..	..	48	..
Rex sole	..	..	39	..
Rock sole	..	..	..	21
Other flatfish	..	..	..	..
Sebastes alutus	..	..	..	..
S. babcocki	..	..	39	..
S. brevispinis	1815	530	106	21
S. crameri	..	..	..	..
S. diploproa	..	..	..	..
S. elongatus	..	..	..	..
S. entomelas	..	49	29	758
S. flavidus	..	701	1478	1664
S. jordani	..	..	..	..
S. paucispinis	1742	709	48	..
S. pinniger	36	24	..	84
S. proriger	..	..	..	..
S. reedi	..	..	..	..
S. ruberrimus	..	..	..	..
S. zacentrus	..	..	..	..
Other rockfish	..	..	..	..
Chinook salmon	..	122	..	..
Lingcod	36	..	..	..
Pacific cod	..	17	213	42
Pacific hake	..	..	68	..
Pacific herring	..	..	..	..
Sablefish	..	..	..	..
Walleye pollock	..	..	..	84
Other roundfish	..	..	..	..
Ratfish	..	..	106	..
Big skate	..	..	..	158
Spiny dogfish	..	106	58	53
Other selachii	..	..	..	..
Total Catch (kg)	3629	2454	2721	2948

Appendix Table 2 (cont'd)

Haul Number		13	14	15	16
Date		Nov 13	Nov 13	Nov 14	Nov 14
Area (Major, Minor)		5B,08	5B,08	5B,08	5A,11
Start Time	(PST)	5:45	15:34	5:00	12:00
Duration	(Min)	255	40	260	380
Start N. Lat.	(Deg)	51	51	51	51
	(Min)	23.1	31.1	25.2	9.6
W. Long	(Deg)	129	128	129	129
	(Min)	8.4	39.7	5.1	15.1
Start LORAN-C	X	13342.9	13448.0	13349.1	13373.7
	Y	30137.8	30188.9	30148.6	30074.0
Finish N. Lat.	(Deg)	51	51	51	51
	(Min)	21.8	32.3	21.1	13.4
W. Long	(Deg)	129	128	129	128
	(Min)	27.6	37.4	17.1	44.4
Finish LORAN-C	X	13256.5	13455.1	13310.2	13507.2
	Y	30122.9	30195.6	30124.8	30105.9
Haul Distance	(km)	22.4	3.5	15.9	36.5
	(N Mi)	12.1	1.9	8.6	19.7
Direction (Deg.True)		220	39	242	247
Bottom Depth	(m)	187- 168	117- 123	155- 177	201- 183
	(fm)	102- 92	64- 67	85- 97	110- 100
Modal Depth	(m)	178	120	166	192
Gear Type		BT	BT	MW	MW
Tide		..	..	..	..
Total Catch	(kg)	2494	45	1361	5443
Remarks		Usable	Usable	Usable	Usable

Appendix Table 2(cont'd)

Haul Number	13	14	15	16
Date	Nov 13	Nov 13	Nov 14	Nov 14
Area (Major, Minor)	5B,08	5B,08	5B,08	5A,11
Arrowtooth flounder	151	..	..	..
English sole	..	..	..	..
Flathead sole	..	..	..	..
Pacific halibut	..	..	..	..
Petrale sole	..	..	..	..
Rex sole	10	..	..	..
Rock sole	..	..	..	..
Other flatfish	..	..	..	..
Sebastes alutus	..	..	..	..
S. babcocki	141	..	..	..
S. brevispinis	935	4	..	..
S. crameri	..	..	..	..
S. diploproa	..	..	..	..
S. elongatus	..	..	..	..
S. entomelas	101	..	..	..
S. flavidus	715	..	454	5443
S. jordani	..	..	..	..
S. paucispinis	50	..	..	..
S. pinniger	..	..	..	..
S. proriger	40	..	..	..
S. reedi	20	..	..	..
S. ruberrimus	..	..	..	..
S. zacentrus	..	..	..	..
Other rockfish	..	..	..	..
Chinook salmon	..	..	..	..
Lingcod	80	8	..	..
Pacific cod	..	..	..	..
Pacific hake	..	..	..	..
Pacific herring	..	..	907	..
Sablefish	..	..	..	..
Walleye pollock	231	..	..	..
Other roundfish	..	..	..	..
Ratfish	..	..	..	..
Big skate	..	..	..	..
Spiny dogfish	20	33	..	..
Other selachii	..	..	..	..
Total Catch (kg)	2494	45	1361	5443

Appendix Table 2 (cont'd)

Haul Number		17	18	19	20
Date		Nov 15	Nov 15	Nov 15	Nov 16
Area (Major, Minor)		5A,11	5A,11	5A,11	3D,27
Start Time	(PST)	8:00	11:00	14:00	16:13
Duration	(Min)	90	150	135	60
Start N. Lat.	(Deg)	50	50	50	50
	(Min)	41.7	38.9	33.9	10.9
W. Long	(Deg)	128	128	128	128
	(Min)	48.7	33.3	25.5	6.2
Start LORAN-C	X	13617.3	13702.2	13758.1	13924.9
	Y	29950.9	29939.0	29915.2	29789.8
Finish N. Lat.	(Deg)	50	50	50	50
	(Min)	40.1	34.0	29.1	13.6
W. Long	(Deg)	128	128	128	128
	(Min)	41.4	26.0	20.1	6.7
Finish LORAN-C	X	13658.5	13755.3	13800.9	13914.6
	Y	29944.4	29915.7	29890.4	29805.2
Haul Distance	(km)	9.1	12.6	10.9	5.0
	(N Mi)	4.9	6.8	5.9	2.7
Direction (Deg.True)		123	110	179	348
Bottom Depth	(m)	183- 183	152- 157	154- 154	168- 183
	(fm)	100- 100	83- 86	84- 84	92- 100
Modal Depth	(m)	172	155	154	170
Gear Type		BT	BT	BT	BT
Tide		..	..	..	..
Total Catch	(kg)	1133	453	3175	7257
Remarks		Usable	Usable	Usable	Usable

Appendix Table 2 (cont'd)

Haul Number	17	18	19	20
Date	Nov 15	Nov 15	Nov 15	Nov 16
Area (Major, Minor)	5A,11	5A,11	5A,11	3D,27
Arrowtooth flounder	21	..	10	..
English sole	..	45	..	..
Flathead sole	5	..	..	..
Pacific halibut	..	..	..	..
Petrale sole	..	..	..	..
Rex sole	..	..	..	..
Rock sole	..	..	..	..
Other flatfish	..	..	..	..
Sebastes alutus	..	..	..	..
S. babcocki	26	..	..	..
S. brevispinis	772	363	2070	..
S. crameri	5	..	..	..
S. diploproa	..	..	..	..
S. elongatus	..	..	..	..
S. entomelas	..	..	..	..
S. flavidus	62	..	217	726
S. jordani	5	..	..	..
S. paucispinis	26	..	726	..
S. pinniger	129	..	..	6531
S. proriger	31	..	..	..
S. reedi	..	..	..	..
S. ruberrimus	..	..	..	..
S. zacentrus	5	..	..	..
Other rockfish	..	..	..	..
Chinook salmon	..	..	..	..
Lingcod	..	..	..	..
Pacific cod	21	45	87	..
Pacific hake	..	..	..	..
Pacific herring	..	..	..	..
Sablefish	..	..	..	..
Walleye pollock	5	..	22	..
Other roundfish	5	..	..	..
Ratfish	..	..	..	..
Big skate	..	..	..	..
Spiny dogfish	15	..	43	..
Other selachii	..	..	..	..
Total Catch (kg)	1133	453	3175	7257

Appendix Table 2 (cont'd)

Haul Number		21	22	23	24
Date		Nov 17	Nov 17	Nov 19	Nov 19
Area (Major, Minor)		3D,25	3D,25	3D,25	3D,25
Start Time	(PST)	7:20	12:32	16:05	21:20
Duration	(Min)	156	63	57	190
Start N. Lat.	(Deg)	49	49	49	49
	(Min)	27.7	35.5	28.1	36.9
W. Long	(Deg)	127	127	127	127
	(Min)	13.2	16.6	3.1	17.5
Start LORAN-C	X	14270.6	14241.3	14315.3	14234.5
	Y	29507.9	29560.2	29503.6	29569.7
Finish N. Lat.	(Deg)	49	..	49	49
	(Min)	34.2	..	36.0	30.0
W. Long	(Deg)	127	100	127	126
	(Min)	16.1	..	3.0	58.0
Finish LORAN-C	X	14245.0	..	14302.5	14335.2
	Y	29551.6	..	29555.6	29512.7
Haul Distance	(km)	12.6	0.0	14.6	26.9
	(N Mi)	6.8	0.0	7.9	14.5
Direction (Deg.True)		330	310	305	120
Bottom Depth	(m)	177- 165	161- 157	163- 157	146- 150
	(fm)	97- 90	88- 86	89- 86	80- 82
Modal Depth	(m)	170	159	174	146
Gear Type		BT	BT	BT	BT
Tide		..	..	..	..
Total Catch	(kg)	125	317	2041	2268
Remarks		Usable	Snag-Use	Usable	Usable

Appendix Table 2 (cont'd)

Haul Number	21	22	23	24
Date	Nov 17	Nov 17	Nov 19	Nov 19
Area (Major, Minor)	3D,25	3D,25	3D,25	3D,25
Arrowtooth flounder	..	..	58	..
English sole	..	..	..	..
Flathead sole	..	..	..	..
Pacific halibut	..	..	..	..
Petrale sole	..	..	..	..
Rex sole	..	..	..	..
Rock sole	..	..	..	..
Other flatfish	..	..	..	..
Sebastes alutus	..	..	8	..
S. babcocki	..	..	..	..
S. brevispinis	..	45	90	340
S. crameri	..	..	..	..
S. diploproa	..	..	8	..
S. elongatus	..	..	8	..
S. entomelas	..	..	90	..
S. flavidus	34	272	884	1928
S. jordani	..	..	..	..
S. paucispinis	..	..	263	..
S. pinniger	91	..	457	..
S. proriger	..	..	8	..
S. reedi	..	..	..	..
S. ruberrimus	..	..	..	..
S. zacentrus	..	..	58	..
Other rockfish	..	..	..	..
Chinook salmon	..	..	35	..
Lingcod	..	..	..	..
Pacific cod	..	..	..	..
Pacific hake	..	..	58	..
Pacific herring	..	..	..	..
Sablefish	..	..	..	..
Walleye pollock	..	..	..	..
Other roundfish	..	..	..	..
Ratfish	..	..	8	..
Big skate	..	..	..	..
Spiny dogfish	..	..	8	..
Other selachii	..	..	..	..
Total Catch (kg)	125	317	2041	2268

Appendix Table 2 (cont'd)

Haul Number		25
Date		Nov 20
Area (Major, Minor)		3D,25
Start Time	(PST)	7:40
Duration	(Min)	110
Start N. Lat.	(Deg)	49
	(Min)	35.0
W. Long	(Deg)	127
	(Min)	16.7
Start LORAN-C	X	14241.8
	Y	29557.0
Finish N. Lat.	(Deg)	49
	(Min)	39.6
W. Long	(Deg)	127
	(Min)	22.9
Finish LORAN-C	X	14204.6
	Y	29589.7
Haul Distance	(km)	11.3
	(N Mi)	6.1
Direction (Deg.True)		310
Bottom Depth	(m)	155- 165
	(fm)	85- 90
Modal Depth	(m)	159
Gear Type		BT
Tide		..
Total Catch	(kg)	907
Remarks		Usable

Appendix Table 2 (cont'd)

Haul Number	25
Date	Nov 20
Area (Major, Minor)	3D,25
Arrowtooth flounder	..
English sole	..
Flathead sole	..
Pacific halibut	..
Petrale sole	..
Rex sole	..
Rock sole	..
Other flatfish	..
Sebastes alutus	..
S. babcocki	..
S. brevispinis	25
S. crameri	..
S. diploproa	..
S. elongatus	..
S. entomelas	..
S. flavidus	680
S. jordani	..
S. paucispinis	124
S. pinniger	49
S. proriger	6
S. reedi	..
S. ruberrimus	4
S. zacentrus	..
Other rockfish	..
Chinook salmon	..
Lingcod	19
Pacific cod	..
Pacific hake	..
Pacific herring	..
Sablefish	..
Walleye pollock	..
Other roundfish	..
Ratfish	..
Big skate	..
Spiny dogfish	..
Other selachii	..
Total Catch (kg)	907